three, and the range of subjects was more limited; otherwise the examination was exactly the same as in the period 1848–72. But Part III. was a complete novelty, and a great deal of curiosity was felt as to how the first Moderators and Examiners would interpret the regulations. Would the new examination resemble, as regards the character of the questions set, the last three days of the old five days, or was the examination to be one of a distinctly higher order? The result showed that the latter anticipation was the correct one. No longer hampered by the order of merit, the examiners felt themselves free to set difficult and elaborate questions, such as were only appropriate to specialists in the particular subjects; and a new departure was made.

As soon as the new system came into full operation, it was found that it needed amendment in various respects; and this is not to be wondered at, considering that it had been constructed in order to fit in with the few regulations that had escaped the general massacre of May 1878, and that almost every part of it was the result of a compromise. It was found that the interval between June and January—less than seven months, and including a long vacation in which very few lectures were given—was too short for an adequate preparation for Part III. It is true that most of the work for Part III. could be done—and indeed was done—before the examination in Parts I. and II.; but the competition in these two parts remained as keen as ever, and, as the examination became imminent, the candidates were tempted to neglect the higher work, and give their whole attention to the more elementary subjects, upon which the list in order of merit depended. As a consequence there was a diminution in the numbers of students attending the higher mathematical lectures in the University. With respect to the actual conduct of the examination, it was found that the strain upon the Moderators and Examiners was very serious, and general regret was expressed that under the new scheme no provision had been made for the annual appointment of an Additional Examiner, as in the previous scheme which had been in operation from 1873 to 1882. Under the new system the candidates devoted themselves to special branches of the higher mathematics, and there was even greater difficulty in adequately representing all the subjects of examination. Accordingly, on June 12, 1884, the Senate confirmed a Report of the Mathematical Board recommending that the examination in Part III. should take place in June, exactly a year after that in Parts I. and II., and that the Moderators and Examiners, with the Chairman of the Mathematical Board, should nominate an Additional Examiner, the first nomination being made in the Easter term, 1885, and having reference to the examination in January 1886. It was considered that the Moderators and Examiners were themselves the best judges of the branches of mathematics in which they most desired assistance, and were therefore the most suitable body to nominate the Additional Examiner.

The last time that the whole examination took place in January was in 1882. This year (1886) the examination in Part III. has taken place in January for the last time, so that the historic connection between the Tripos and the month of January has now finally ended. Henceforth the examination in all three parts will take place in the middle of the year.

(*To be continued.*)

EARTHQUAKE AT SEA

We have received the following communication from Mr. R. H. Scott, F.R.S., Secretary, Meteorological Office:—

British Consulate, St. John's, Porto Rico,
November 4, 1886

Sir,—I have the honour to inform you that Mr. J. Simmons, master of the British brigantine *Wilhelmina*, of Lunenburg, now loading in this port, has reported to me that, on October 20 last, at 4.30 p.m., while in latitude 19° 21′ N., and longitude 64° 22′ W., he felt a shock of earthquake which caused the ship to tremble. The shock lasted one minute, and was accompanied by a loud rumbling noise like distant thunder. Capt. Simmons states further that, were it not that he believed the depth of water at the spot to be no less than two thousand fathoms, he could have imagined that his vessel was running upon the rocks, so great was the vibration and so loud the noise. I have thought it my duty to report this occurrence officially, as it seems not improbable that some volcanic disturbance is in operation in the locality herein referred to.

I have the honour to be, Sir, your most obedient humble servant,

Reginald H. Hertslet,
H.M. Consul

The Assistant Secretary, Marine Department,
Board of Trade

NOTES

We regret to hear of the death at Calcutta of Father Scortechini from dysentery. He has succumbed to his extraordinary exertions in the botanical exploration of Perak, where he had made very large and valuable collections. These he intended to make the basis of a flora of this native State in collaboration with Dr. King, the Superintendent of the Royal Botanic Garden, Calcutta. His collections will, as far as possible, be made use of by Sir Joseph Hooker in the portions of the flora of British India now in progress at Kew.

One of the severest storms of recent years swept over the country in the middle of last week, being indeed a storm seldom paralleled for its wide-spread destructiveness. The damage to property and the loss of life have been exceptionally great, and each morning newspaper has been adding to the long tale of losses and disasters. Another peculiarity of the storm is that it was heralded with only the slightest premonitions of its approach. It was at Valencia only that the observations of the previous evening indicated a storm, and these even seemed to foreshadow no more than a subsidiary cyclone. But on Wednesday morning last week the centre of the storm had already advanced on the north-west of Ireland, where at Belmullet, at 8 a.m., the barometer had fallen, at 32° and sea-level, to 27·580 inches. In the course of the day the cyclone moved eastward at the rather slow rate of 20 miles an hour, and by 6 p.m. its centre was near Barrow-in-Furness, where the barometer is stated to have fallen to 27·410 inches. The centre passed somewhat to the south of Edinburgh, about half-past seven, pressure being then 27·650 inches, and the wind easterly. The greatest interest is attached to the observations that may have been made in the north of England and the south of Scotland during the evening of Wednesday week, from which the path of the cyclone may be traced; and particularly, if the low reading at Barrow-in-Furness be confirmed, what lower readings of the barometer were made to the eastward. But in any case it is plain that in this part of Great Britain, on the evening of Wednesday week, pressure fell nearly as low as it did on January 26, 1884, at Ochtertyre, Perthshire, where it fell to 27·333 inches; and it is remarkable that these two low barometers, hitherto the lowest observed by man anywhere on the land surfaces of the globe after being reduced to sea-level, have occurred in the British Islands, and within three years of each other. It is noteworthy that the lowest pressure on Ben Nevis was 23·451 inches at 2h. 31m. p.m., and that at the height of the storm, at 6 p.m., the wind was south-east, and blowing at the rate of fully 120 miles an hour—thus indicating that the storm was not only wide-spread, but that it also, as regards direction and force of wind, extended to a greater altitude than the Ben Nevis Observatory.

MR. T. H. COX, of the firm of Cox Brothers, manufacturers, Camperdown Linenworks, Lochee, has given a donation of 12,000*l.* for the endowment and equipment of a Chair of Anatomy in connection with the Medical School it is proposed to establish in University College, Dundee.

WE are glad to notice that in the new French Ministry M. Berthelot, the eminent chemist, takes the portfolio of Education.

AN electrical metronome has been established at the Paris Opera House, which enables the *chef d'orchestre* to conduct choruses at any distance from his chair. The working is very satisfactory, and the effect really admirable.

THE late Prof. Morris at the time of his death had made considerable progress with a third edition of his "Catalogue of British Fossils." Some of his friends, reluctant that so valuable a work should be lost to science, have arranged to revise and complete the manuscript, and the necessary expenses of preparing it for the press have been guaranteed by his nearest surviving relative, who rightly holds that this will be the best monument to his memory. The editor-in-chief is Dr. H. Woodward, of the British Museum, and he is assisted by a number of eminent specialists, among whom are Drs. Hinde and Traquair, Profs. Duncan, Rupert Jones, Lapworth, Nicholson, and H. G. Seeley, Messrs. Carruthers, Etheridge, Hudleston, and Lydekker. The Syndics of the Cambridge University Press have now undertaken the publication of the work, which it is hoped may appear in the course of the coming year.

THE annual distribution of prizes and certificates to the successful students at the City and Guilds of London Institute was held on Monday night, when the Lord Chancellor gave an address in which he contrasted the restrictions which hampered industrial progress in the past with the complete freedom and publicity of the present day.

A VIOLENT shock of earthquake occurred at Smyrna and also at Chios on the morning of December 11. Frequent oscillations have been felt at Smyrna during the past fortnight, causing fissures in the walls and fronts of many houses in the town. A shock was felt on the 8th in Missouri City and in Missouri State, and a shock is also reported from Columbia, South Carolina. On the night of November 1, at 12.15 p.m., a sharp shock was felt at Nordheinsund, on the west coast of Norway. Houses and windows shook, whilst a man walking in the road felt the earth slowly rock under him. The shock, which was accompanied by a heavy rumbling noise, was from northwest to south-east.

A CORRESPONDENT in South Africa writes:—"*Rogeria longiflora*, the Martynia-like plant, has capsules which pierce the lips of the gnu or 'wildebeest,' and are rubbed to pieces in their efforts to get rid of them. Truly, what with *Uncaria*, costing the life of a springbok for every capsule trodden out, and *Rogeria* festering in the poor 'wildebeest's' mouth, the beneficent 'Nature' of the teleologist is in Africa a remarkably cruel divinity."

IN an interesting recent paper on Siberia as a colony, Prof. Petrie points out that there are two classes of colonists there—those attracted by the immense wealth of the country in furred animals and minerals, and an industrious people from the Russian peasant class engaged in agriculture. The number of wild animals taken in the boundless forests of Siberia shows a great reduction from year to year. The fisheries are capable of great development, and multitudes of fish are thrown away because the art of salting and preserving is not understood. In Ural, the southern steppes, Altai, and other places, there is immense mineral wealth in silver, gold, iron, lead, copper, anthracite, graphite, &c. The steppes (quite different from the Central Asiatic and Kirghisian) are well suited for cattle-breeding; they have excellent grass and numerous birch woods, and also many lakes, large and small. In Western Siberia, about 32 per cent. of the whole land is arable. With her four rivers of the first rank, three of them flowing north and the other east, Siberia is well off for intercommunication by water and for transport of commerce to neighbouring countries. Notwithstanding three hundred years of occupation, the Russians in Siberia only amount to 4,800,000, and there are nearly as many natives. The Russian colonist in Siberia diverges from the Sclav type, as the Yankee does from the Englishman. At present, farming and cattle-breeding in Siberia are carried on in an irrational way, commerce is in absolute dependence on European Russia, and the roads are dreadfully bad, so that, *e.g.*, people commonly make circuits rather than use the post route from Tomsk to Irkutsk. There is, however, a party of intelligent Siberians bent on gaining the liberties and advantages of the mother country, stopping the deportation of criminals, and promoting education, &c. Many thousand roubles have been contributed by Siberian merchants to found the Tomsk University and other institutions.

MR. J. B. MEDLAND, of 12, Borough, has sent us a specimen of his new portable cabinet for microscope-slides. The cabinet has sixteen trays to hold nine objects each, contained in a well-made polished pine case. When closed, it is the same height and width, and only two inches and a half longer than the ordinary case holding only half the number. Each glass slip is held at its ends by the projecting side flap of the tray, which is held down by the succeeding tray, and so on, the lid holding the whole firmly down. When open, the lid and front fall back, forming a stand or table to place the trays upon, keeping them together and less liable to get displaced or upset, as when placed among other apparatus or upon the desk or work-table. The advantages of the cabinet will be obvious to microscopists.

A WORK by Mr. J. Allen Brown will appear early in January, published by Messrs. Macmillan and Co., entitled "Palæolithic Man in North-West Middlesex; the Evidence of his Existence, and the Physical Conditions under which he lived in Ealing and its Neighbourhood, illustrated by the Condition and Culture presented by certain existing Savage Races."

THE Council of the Essex Field Club has determined in future to issue the *Transactions* and *Proceedings* of the Club combined in the form of a monthly periodical, entitled *The Essex Naturalist; being the Journal of the Essex Field Club.* The journal will contain papers read before the Club, reports of past and announcements of future meetings, and, as space allows, notes and communications upon any matters of interest connected with the natural history, botany, geology, and prehistoric archæology of Essex. We believe that this is a new departure in the policy of local societies, at least in the south of England, but the plan has been adopted by the Essex Club from a rapidly growing conviction that, if local societies are to flourish and do useful work, it is necessary to devise some means of "keeping touch" with their members, and encouraging intercommunication among them. The first number of the *Essex Naturalist* will appear in January next, and will be conducted by Mr. W. Cole, who has edited the publications of the Club since its establishment seven years ago.

THE Japanese Government has despatched an official of the Ministry of Commerce to Norway, in order to study the cod-fisheries, the preparation of oil, &c., in that country, the object being to develop these industries in Northern Japan, where large numbers of cod appear at certain seasons.

SOME important geological work has just been carried out at Landsort, near Stockholm. Close to the coast, pipes have been driven through the rock to the sea, by which sea-water will be carried up into a specially constructed kiosk for examination and registration, the object being to measure the elevation of the shore in course of time. It is intended to establish similar stations at various places on the coast.

BETWEEN 8 and 9 o'clock on November 3 a remarkable phenomenon was observed at Hamar, in Norway. At the time there was perfect darkness, when, suddenly, a bright white cloud appeared in the sky, drifting in a north-easterly direction, and from time to time emitting brilliant rays of light in various directions. The cloud retained throughout its original form, and disappeared at last in the darkness.

FISH-HATCHING operations have now commenced at the establishment of the National Fish Culture Association. The new hatchery that has lately been constructed is completed, and a batch of ova has already been laid down for incubation. These were taken from *Salmo fontinalis* located in the ponds of the establishment. A large number of rainbow trout (*S. iridens*), of California, hatched out two years ago by the Association, from ova sent by the American Government, will be ready to spawn at the end of the year, which is six weeks earlier than in their native waters. This shows to what extent fish alter their natures and habits according to the climatic and other conditions of their locations. The *S. iridens* is a late spawner in its native country, which is accounted for by the hardness of the water and the low temperature that prevails. It is hoped to secure a large quantity of ova from these fish. The American Government have announced their intention of forwarding consignments of ova from Transatlantic Salmonidæ. A feature is to be made this year of hatching ova for Fishery Boards and other public bodies, who will collect ova from their respective waters and forward them to the Association for incubation. When hatched, the fry will be turned into the parts from whence they came.

ACCORDING to the *Colonies and India*, a discovery of much geological interest has just been made at Cockatoo Island, Sydney. A large fossil shell of the genus Planorbis was found in the excavation for a new Government dock at Cockatoo Island, and was forwarded to Mr. Wilkinson, the Government Geologist of New South Wales. This being the first fossil shell found in the Hawkesbury formation, he took the opportunity of examining the rocks, but only obtained some fossil plants. As, however, the rocks looked promising for fossil remains, he sent the collector, Mr. Cullen, to make a further search, which was rewarded by the discovery of a most interesting fossil, which Prof. W. J. Stephen has identified as *Mastodon aurus*, of which a similar fossil specimen from Stuttgart is in the collection of the Sydney University. This being the first discovery in Australia of Labyrinthodon, is of much scientific importance, as proving the Triassic age of the Hawkesbury sandstone formation.

THE first number is to hand of the *Proceedings* of the Camera Club, the President of which is Capt. Abney. It is nicely printed, and will no doubt prove useful to members and to photographers generally.

THE additions to the Zoological Society's Gardens during the past week include a Sclater's Curassow (*Crax sclateri* ♀) from South America, a Razor-billed Curassow (*Mitua tuberosa*), a Lesser Razor-billed Curassow (*Mitua tomentosa*) from Guiana, presented by Rear-Admiral Fairfax, R.N., F.Z.S.; a Spanish Terrapin (*Clemmys leprosa*) from Spain, presented by Miss Eden; eighteen Brown Newts (*Spelerpes fuscus*), South European, presented by Prof. H. H. Giglioli, C.M.Z.S.; two European Phyllodactyles (*Phyllodactylus europæus*) from Cannes, presented by Mr. J. C. Warburg; two Peruvian Thicknees (*Œdicnemus superciliaris*) from Peru, an Allied Saltator (*Saltator assimilis*) from Brazil, an Australian Sheldrake (*Tadorna tadornoides*) from Australia, received in exchange; a Common Zebra (*Equus zebra* ♂) from South Africa, two Shore Larks (*Octocorys alpestris*), British, purchased.

OUR ASTRONOMICAL COLUMN

PUBLICATIONS OF THE WASHBURN OBSERVATORY, VOL. IV.—In the month of March 1884, Prof. Holden offered to Prof. Auwers to undertake the observation at Madison of the 303 fundamental stars required for the southern zones of the Astronomische Gesellschaft. In view, however, of the smallness of the staff of the Observatory, Prof. Holden would only pledge himself to secure four complete observations of each star; but, with his assistants, Mr. Comstock worked with so much zeal and energy that on his appointment to the Lick Observatory in the autumn of 1885, the stars from 0h. to 6h. of R.A., and from 12h. to 24h. had all been completely observed six times, the number Prof. Auwers had desired, in each element. Mr. Updegraff and Miss Lamb, who had latterly been Prof. Holden's assistants, succeeded in bringing the entire work to completion by the close of 1885, no fewer than 6444 observations of stars, irrespective of observations of the nadir point, having been secured in the course of its carrying out. The observations were always kept in a forward state of reduction, and thus the present volume contains the results of the entire work. Prof. Holden was not, however, able to give the observations so full a discussion as he had intended, and as they themselves seemed to merit by their accuracy. The probable error of a single R.A. of stars of the 303 list, observed in 1884, he found to be ± 0·037s. for himself, ± 0·031s. for Mr. Comstock; and for a single declination, for himself ± 0″·400, for Mr. Comstock ± 0″·436.

The results of these observations, which were made with the Repsold meridian-circle of 4·8 aperture, an instrument of essentially perfect optical and mechanical quality, naturally occupy the greater part of the present volume. It also contains some other matters of interest, amongst which may be noted a series of observations with wire screens before the object-glass of the meridian telescope, for the purpose of ascertaining the effect of magnitude on the recorded time of transit, and the determination of the longitude of a station near the western boundary of Dakota. It has been Prof. Holden's effort also to make the collection of star catalogues in the library of the Observatory as complete as possible, and for that purpose he has bought most of the principal catalogues attainable, and marked in them, so far as possible, all the errata which were known to him. A list of the sources from whence these corrections have been derived is here given, and will doubtless be of considerable use to other astronomers.

THE SECOND ARMAGH CATALOGUE OF 3300 STARS.—Dr. Dreyer, on his appointment to the direction of the Armagh Observatory after the death of Dr. Robinson, found a great mass of unpublished meridian observations which had been accumulating since 1859, the date of the publication of the first Armagh Catalogue. On the completion of that great work, Dr. Robinson had formed the plan of re-observing a number of stars occurring in Baily's Catalogue from Lalande's "Histoire Celeste," and the observations were commenced in 1859, but the work was interrupted at the end of the following year, the Primate, Lord John George Beresford, having generously provided a new telescope of 7 inches aperture for the mural circle, instead of the old one of 3¾ inches aperture. The idea of Dr. Robinson, of converting the mural circle into a transit instrument by the addition of a second pier, was not, however, carried out. The observations were recommenced in April 1863, the Rev. W. H. Rambaut being the observer from August 1864 to July 1868, and the Rev. C. Faris from November 1868 to the beginning of 1882. Dr. Dreyer himself observed during 1883, with the end of which year the observations close. Considering that the majority of the stars had, in the course of late years, been observed in the zones of the Astronomische Gesellschafte, and that nearly all might be expected to be included in the forthcoming great Paris Catalogue, Dr. Dreyer thought it important to publish the Armagh results as speedily as possible, and the Government Grant Committee of the Royal Society having promised to meet the cost of publication, the present Catalogue was prepared. It contains the results of the whole of the meridian work carried on at the Observatory since 1859;